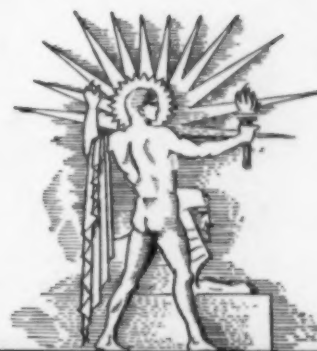


SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE •



APRIL 16, 1932

Fresh from an Ancient Treasure Tomb

See Page 245

A

SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

VOL. XXI

No. 575

The Weekly
Summary ofCurrent
Science

Published by

SCIENCE SERVICE

The Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by WATSON DAVIS

Subscription rates—\$5.00 a year postpaid; two years, \$7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

In requesting change of address, please give old as well as new address.

Advertising rates furnished on application.

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Publication Office, 1930 Clifton Ave., Baltimore, Md. Editorial and Executive Office, Constitution Ave. at 21st St., N. W., Washington, D. C.

Address all communications to Washington, D. C. Cable address: Scienservice, Washington.

Entered as second class matter October 1, 1926, at the post-office at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. and Canadian Patent Offices.

? DO YOU KNOW THAT ?

Alcohol used in extraction of drugs can be recovered and re-used as many as fifteen times.

A sugar maple tree when tapped yields on the average fifteen gallons of sap, though some may yield forty gallons.

Growers of citrus fruits in California are having new difficulties with their most serious pest, red scale, which is gaining a tolerance for the cyanide fumes that heretofore kept it in check.

Honey is now being sold in tubes, like toothpaste.

New museums are springing up in this country at the rate of one a month.

Much of the damage to wool, fur, and feathers for which clothes moths are blamed is really done by carpet beetles.

The U. S. Department of Agriculture has compiled a list of the flowers popular in George Washington's time, for the information of modern garden makers.

As far back as 1700 B. C., people in India had ideas of dental hygiene and were accustomed to clean their teeth with twigs.

The pelican's pouch is used as a scoop or dipnet for fishing, not for storing fish.

Dry wood is as much as two and one-half times as strong as the same wood when it is green, says the U. S. Forest Service.

Germany, leading producer of amber, has an annual output of 600,000 to 900,000 pounds, of which 75 per cent. is melted into amber oil.

A hidden store of pearls, gold pendants, and bronze and silver necklaces belonging to the Vikings was recently found under a stone by two fishermen near Visby, Sweden.

The carbonated beverage industry in this country traces its origin to a little chemist shop in Philadelphia, where fruit juices were added to artificially carbonated water, in 1807.

WITH THE SCIENCES THIS WEEK

CURIOSITY-AROUSING questions are prepared concerning the most interesting and important news in each issue. These questions should be a mental stimulant for the adult reader and a boon to the teacher who uses the Science News Letter to add zest to her classroom instruction.

Book reference in italic type is not the source of information of the article, but a reference for further reading on the subject of the article. Books cited can be supplied by Librarian, Science Service, at publisher's price, prepaid in U. S.

ARCHAEOLOGY

How large an area does the newly-found Indian pueblo cover? p. 244.

Where was the new Indian tomb opened? p. 245.

ASTRONOMY

What is the name of the recently-discovered comet? Where was it first located? p. 245.

BIOCHEMISTRY

Why is the isolation of the male sex hormone important? p. 250.

CHEMISTRY

What is the atomic number of uranium? p. 250.

ENGINEERING

How many compartments does the submarine rescue jar have? How do they function? p. 249.

ETHNOLOGY

Who were the official dream-interpreters of ancient Egypt? p. 248. *The Nile and Egyptian Civilization*—Alexandre Moret—Knopf, 1927, \$7.50.

INVENTION

How many patents were issued last year? p. 239. *Inventions and Patents*—Milton Wright—McGraw-Hill, 1927, \$2.50.

MEDICINE

On what facts is the new cancer test based? p. 245.

What are two risks a person runs who has high blood pressure? p. 241. *How's Your Blood*

Pressure?—Clarence L. Andrews—Macmillan, 1931, \$2.50.

What is the theory of the new treatment of stomach ulcer? p. 248.

METEOROLOGY

How are doubled-cone-shaped snowflakes formed? p. 245. *Snow Crystals*—W. A. Bentley and W. J. Humphreys—McGraw-Hill, 1931, \$10.

ORNITHOLOGY

What does the crow like best to eat? p. 251.

PHYSICS

How does the attraction of the two opposite elemental poles compare with that between the electron and proton? p. 243. *Electricity and Magnetism*—Charles A. Culver—Macmillan, 1930, \$3.25.

PHYSIOLOGY

What chemical leaks from the brain cells to cause epilepsy? p. 251.

PUBLIC HEALTH

What deadly germ may home-canned vegetables contain? p. 244.

RADIO

What lengths include the short radio waves? p. 246.

ZOOLOGY

How long did the herons in the public squares of Alameda tolerate alarm clocks? p. 244.

INVENTION

Leaders of Invention Tell What the World Needs Most

Opening of New Patent Office in Washington Occasion For Scientists to Predict the Next Great Invention

LEADERS in invention and application of science to civilization have given their opinions on what the world needs most at the present time.

As its share in the formal opening of the new U. S. Patent Office at Washington this week, Science Service invited eminent American inventors to express an opinion on: "The Next Great Invention: What does the world need most?"

The U. S. Patent Office, celebrating the opening of its beautiful quarters in the Department of Commerce building, has been operating in its present form for nearly a hundred years. Patents have been issued by the United States Government for a much longer period, however. They are provided for in the first article of the Constitution where Congress is given power "To promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive rights to their respective writings and discoveries."

It was in 1836 that the Patent Office started to number serially the patents issued. By the time the full century has passed, these serial numbers will be larger than two million. Already a patent has been granted bearing the number 1,856,041. During the last fiscal year 44,317 patents were granted, or, if one counts design patents, trade-marks, and so on, the grand total is 62,708. Applications for patents received during the one year numbered 84,097, and the total number of applications filed in the office amounted to 106,893.

And yet inventive ability as indicated by patents issued is not very common. The patents issued in the United States annually amount to only one for every 2,770 of the population.

Sun Power Motor

By **ORVILLE WRIGHT**,
Inventor of Airplane

I WILL not attempt to predict what will be the next "great invention," but as man's physical well-being depends

largely upon the amount of power at his command I would say that "the most needed invention" is a motor which economically converts the latent energy in matter into motive power, or economically derives power directly from the rays of the sun.

Better Government

By **DR. LEO H. BAEKELAND**,
Inventor of Bakelite

A MOST needed invention is a system of Government which does not develop into paradoxical exaggerations which defeat its best purposes.

Our Republic is now being mastered by cunning minorities of Congressmen who, by clever manipulation of existing rules, resort to any available expedients when they start bartering for votes with anyone who is likely to insure their reelection, which is their dominant purpose.

Heat Underfoot

By **DR. LEE de FOREST**,
Radio Engineer and Inventor

I BELIEVE the next great invention (or group, for several inventions are required to solve the problem) will be practical Television, first in the theatre, then in the home, by wire and radio.

But this is not, in my opinion, what the world needs most. The urgent need of mankind is for unlimited sources of

power, at costs so low as to revolutionize our methods and conditions of working and living.

Such power lies a few miles beneath our feet. The next generation will see man delving and boring, not for fuel, coal, nor mineral wealth, but to tap the limitless fountains of heat, by some durable means which will permit us to send down water and get back high temperature steam, or some equivalent energy absorbing and emitting medium.

Then electric power will be at our doors for heating, for cooling our houses, for purifying our air, propelling our vehicles (supposing suitable storage batteries)—doing all manual work, in factory, farm, and home, speeding and enormously increasing vegetable and crop growth, illuminating homes, streets and all country roadways with light like that of day.

"Knowledge is Power" the Sage has said; but Power will bring knowledge and leisure to acquire it, and the immeasurable blessings which follow in its train.

Sun's Radiant Energy

By **DR. ELIHU THOMSON**,
Electrical Pioneer and Inventor, Director, Thomson Research Laboratory, General Electric Company

SOME people would be inclined to answer that what the world needs most is a more perfect civilization, a better psychology throughout the peoples of the world. If I may be permitted to limit myself to the "greatest future invention," or what the world needs most in the mechanical aspect of things, I would say the "greatest future invention," of which I can conceive the possibility, is some direct method of converting the radiant energy of the sun into electric current with high efficiency. It does seem that such a thing may be a possibility and that solar energy may in years to come be relied upon to fur-



The New Department of Commerce Building which houses the U. S. Patent Office

nish directly the electricity for all the services that are possible with it. I do not think it would be worthwhile to elaborate more upon this idea, although I confess a great deal could be added to this brief comment. There may be other sources of energy of which we know too little, but the radiation from our sun is the most evident source.

Looking forward, I can see no period when the efforts of the inventor or discoverer may not be expected to be fruitful in the service of man.

Homes as Refuge

By L. W. WALLACE,

Executive Secretary, American Engineering Council

WHAT does the world need most? In my judgment: Homes—with five acres of ground; Homes—to serve as a place of refuge in old age and during business depressions; Homes—fully equipped with modern appliances and conveniences, costing less than 20 cents per cubic foot; Homes designed to afford a variety of convenient layouts, sizes and appearances, which may be produced by mass production methods and be inexpensive to erect and maintain.

The inventive skill of the nation should be applied to developing designs, including methods of merchandising and financing. The reward is an ever-increasing and rising economic and social life.

Decent Homes

By ARTHUR D. LITTLE,

Industrial Chemist

WHAT the world needs most in its present crisis are things of the spirit and changes of heart which, unfortunately, no inventor can supply. There is, however, one fundamental, material need in our own country which stands as a challenge to the inventor and which, in my opinion, affords his greatest present opportunity. It is the provision of decent homes for those families of small means which make up the great majority of our population.

The building trades have not tapped ten per cent. of their potential market. They are where Ford would be if he had limited his output to Lincoln cars. The situation calls for the invention of new types of structural units permitting mass production, ready assembly on the site, and the widest possible adaptation to a variety of plans for attractive, dur-

able, and healthful dwellings at a cost within the reach of the average family head.

Perfect Television

By DR. E. F. NORTHRUP,

Physicist and Inventor of Electrical Devices

MOST patentable inventions rest on facts and laws taught by physics and chemistry.

There is a deluge of inventions of this nature, and the "velocity reaction" of things material has become maddening.

These times need inventions, as perfect television, which will promote understanding among normal human beings. The call is for artificial devices, keener than a pointer dog's nose, to locate social misfits and lessen crime.

Inventors are wanted who will teach how higher life-forms may compete more successfully with bacterial and insect predators that are ever present to take food from mouths and torture humanity.

Medical Achievements

By DR. AMBROSE SWASEY,

Mechanical Engineer and Designer of Large Telescopes

NO DOUBT, in the coming years there will be great and important discoveries and inventions in the realm of industrial science, as there have been for a half century or more past. At the present time, however, I have not in mind an invention or improvement for which the world seems to be waiting.

Although quite apart from my field endeavor, may I add, that notwithstanding the wonderful achievements in medical science, there are yet some difficult problems which if solved, as now hoped, will bring countless blessings to mankind throughout the world.

Unknown Ether Waves

By S. M. KINTNER,

Vice-President, Westinghouse Electric and Manufacturing Co.

THE question of the next great invention somewhat suggests the statement of the Irishman that he wished he knew where he was going to die, because if he did he would not go there. This is the way it is with us, if we knew what the next great invention was going to be we would start on it right now. Most anybody that you would ask this question would say—"television," "air con-

ditioning" or some other development that now offers immediate hope of such an accomplishment, but, in addition to those, one might look forward to biophysical accomplishments in the study of the human body and better control of diseases relating thereto; control of insects by radiations, or they might even think of power transmission by radio means, along with other possible great inventions that will follow the discovery of means for producing and detecting ether waves in the now unknown regions of wave lengths.

In thinking over past inventions, I cannot escape the feeling that has so frequently come to me, of how little we appreciated the need for many of them until after they were here, that is, the world to us appeared just as complete before as after these inventions were made.

More Sanity

By DR. FRANK B. JEWETT,

President, Bell Telephone Laboratories

AS TO your query—the Next Great Invention, What does the world need most—I can only say that I have not the ghost of an idea. Even if I had I doubt whether I would be courageous enough to voice it at this time. To my way of thinking, what the world needs most at the present time are not great new inventions, but a good deal more sanity, intelligence and restraint in the handling of its human and economic relations.

New Democracy

By DR. MICHAEL I. PUPIN,

Electrical Engineer and Inventor

THE next great invention will be a democracy in which the professional politician of today will find no place. This is what the world needs most.

Science News Letter, April 16, 1932

A world-wide campaign for more knowledge about the little-understood cosmic radiation, whose rays are the most penetrating known, was begun when Dr. Arthur H. Compton of the University of Chicago, noted physicist, left New York for Panama to start the first investigations.

In Panama Dr. Compton will climb Mt. Chico to measure the rays with a new instrument. He will then go to Huancayo in Peru, Mt. Cook in New Zealand, Mt. Kosciusko in Australia, Mauna Loa in Hawaii and Mt. McKinley in Alaska.

MEDICINE

Sugar Plays Leading Part in Pneumonia Germ's Activity

Is Part of Capsule Surrounding Organism Which Gives It Power to Enter Human Body and to Cause Disease

A NEW understanding of the much-feared pneumonia germ was presented by Dr. Oswald T. Avery of the Hospital of the Rockefeller Institute for Medical Research at the convocation in San Francisco of the American College of Physicians. A complex sugar plays a leading part in the germ's disease-producing activities, it appears from the research Dr. Avery described.

The pneumococcus, or pneumonia germ, is surrounded by an envelope of material known as the cell capsule, he explained. Without this capsule the germ has no power to invade the body or to cause disease and it is easily taken up and destroyed by the phagocytes or scavenger cells of the body, it has been found. This important capsule is probably composed largely of a soluble sugar-like substance which is made by the pneumococcus. Each of the different types of pneumonia germ produces its own specific sugar-like substance, Dr. Avery said.

The sugar of the pneumonia germ is probably not a poison like the poison produced by the diphtheria germ, but it does seem indirectly to hinder recovery from the disease. This is because this sugar tends to bind certain protective substances in the blood and thus to prevent their reaching areas of infection in the body, where they could fight the disease.

Not Produced in Body

Dr. Avery and associates found that the body does not produce any enzyme which can break down the complex sugar of the pneumonia germ's capsule, but a micro-organism found in peat soil does produce such an enzyme. When this enzyme was injected into mice and rabbits suffering from pneumonia, the animals recovered. Likewise, they found that a preparation of this enzyme protected mice from a million times the number of virulent germs which invariably caused death in the animals which were untreated.

When the enzyme breaks up the com-

plex sugar of the germ's capsule, the unprotected germ is ready prey for the scavenger cells of the body. Thus recovery depends both on the presence of the enzyme and on the body's ability to produce scavenger cells to destroy the unprotected pneumonia germ, Dr. Avery explained.

Skin Test Developed

He also told how in the course of this research, an important skin test was developed from the sugar of the pneumococcus. When a little of this sugar is injected into the skin of patients recovering from pneumonia, a reddened spot with a wheal in its center appears. The capacity of the skin to react in this way with the germ's sugar is closely connected with recovery from the infection. The results indicate that this skin test may be significant in foretelling the outcome of the disease, and may also be of value in determining the dosage of antipneumococcus serum to be given in treatment.

Science News Letter, April 16, 1932

MEDICINE

High Blood Pressure May Be Compensatory Reaction

CHEER for persons suffering from high blood pressure was given by Dr. Carl J. Wiggers, professor of physiology at Western Reserve University School of Medicine, in an address before the American College of Physicians.

High blood pressure, he said, must be looked upon as a compensatory reaction designed to restore a normal blood supply to the tissues of the body.

"If the physiological conception that hypertension is Nature's agent, assuring an adequate blood supply to the tissues, could gain firmer root in the doctor's mind and through him be re-



VOLTMETER

Though greatly unlike the familiar little boxed instrument, these shimmering metal spheres three feet in diameter accurately measure potential. Three million volts is their limit of accuracy. Artificial lightning jumps the gap between them in the General Electric Company's high voltage laboratory at Pittsfield, Mass.

layed to his patient, it would do much to remove the feeling of despair and impending doom so common in the layman who learns that his blood pressure is 'high,' declared Dr. Wiggers.

He said that without doubt the patient with a very high blood pressure is confronted with certain risks, such as rupture of the blood vessels or decompensation of the heart, but he suggested that in attempting to avoid these dangers the physician should consider whether an even greater risk is not incurred through the use of drugs which lower systemic pressures generally.

Science News Letter, April 16, 1932

BIOLOGY

Hand and Foot

Part II

"A Classic of Science"

The Hands and Feet of the Higher Apes Are More Like Those of Man Than They Are Like Those of the Monkeys

EVIDENCE AS TO MAN'S PLACE IN NATURE. By Thomas Henry Huxley. London and Edinburgh, Williams and Norgate, 1863.

TO RESUME—the foot of man is distinguished from his hand by the following absolute anatomical differences:

1. By the arrangement of the tarsal bones.
2. By having a short flexor and a short extensor muscle of the digits.
3. By possessing the muscle termed *peroneus longus*.

And if we desire to ascertain whether the terminal division of a limb, in other Primates, is to be called a foot or a hand, it is by the presence or absence of these characters that we must be guided, and not by the mere proportions and greater or lesser mobility of the great toe, which may vary indefinitely without any fundamental alteration in the structure of the foot.

Keeping these considerations in mind, let us now turn to the limbs of the Gorilla. The terminal division of the fore limb presents no difficulty—bone for bone and muscle for muscle, are found to be arranged essentially as in man, or with such minor differences as are found as varieties in man. The Gorilla's hand is clumsier, heavier, and has a thumb somewhat shorter in proportion than that of man; but no one has ever doubted its being a true hand.

At first sight, the termination of the hind limb of the Gorilla looks very hand-like, and as it is still more so in many of the lower apes, it is not wonderful that the appellation "Quadrumanus," or four-handed creatures, adopted from the older anatomists by Blumenbach, and unfortunately rendered current by Cuvier, should have gained such wide acceptance as a name for the Simian group. But the most cursory anatomical investigation at once proves that the resemblance of the so-called "hind hand" to a true hand, is only skin deep, and that, in all essential respects, the

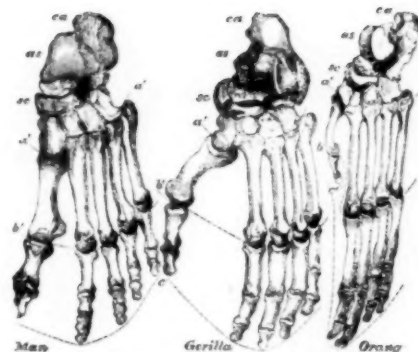
hind limb of the Gorilla is as truly terminated by a foot as that of man. The tarsal bones, in all important circumstances of number, disposition, and form, resemble those of man. The metatarsals and digits, on the other hand, are proportionately longer and more slender, while the great toe is not only proportionately shorter and weaker, but its metatarsal bone is united by a more moveable joint with the tarsus. At the same time, the foot is set more obliquely upon the leg than in man.

As to the muscles, there is a short flexor, a short extensor, and a *peroneus longus*, while the tendons of the long flexors of the great toe and of the other toes are united together and with an accessory fleshy bundle.

The hind limb of the Gorilla, therefore, ends in a true foot, with a very moveable great toe. It is a prehensile foot, indeed, but is in no sense a hand: it is a foot which differs from that of man not in any fundamental character, but in mere proportions, in the degree of mobility, and in the secondary arrangement of its parts.

It must not be supposed, however, because I speak of these differences as not fundamental, that I wish to under-rate their value. They are important enough in their way, the structure of the foot being in strict correlation with that of the rest of the organism in each case. Nor can it be doubted that the greater division of physiological labour in Man, so that the function of support is thrown wholly on the leg and foot, is an advance in organization of very great moment to him; but, after all, regarded anatomically, the resemblances between the foot of Man and the foot of the Gorilla are far more striking and important than the differences.

I have dwelt upon this point at length, because it is one regarding which much delusion prevails; but I might have passed it over without detriment to my argument, which only requires me to show that, be the differences between the hand and foot of Man and those



MAN, GORILLA AND ORANG

Foot of Man, Gorilla, and Orang-Utan of the same absolute length, to show the differences in proportion of each. Reduced from original drawings by Mr. Waterhouse Hawkins. (Reproduced from "Evidence as to Man's Place in Nature")

of the Gorilla what they may—the differences between those of the Gorilla, and those of the lower Apes are much greater.

It is not necessary to descend lower in the scale than the Orang for conclusive evidence on this head.

The thumb of the Orang differs more from that of the Gorilla than the thumb of the Gorilla differs from that of Man, not only by its shortness, but by the absence of any special long flexor muscle. The carpus of the Orang, like that of most lower apes, contains nine bones, while in the Gorilla, as in Man and the Chimpanzee, there are only eight.

The Orang's foot is still more aberrant; its very long toes and short tarsus,

Who Invented The Steamboat?

Evidence from two of the "original inventors"

FITCH AND RUMSEY

will form the next
CLASSIC OF SCIENCE

short great toe, short and raised heel, great obliquity of articulation in the leg, and absence of a long flexor tendon to the great toe, separating it far more widely from the foot of the Gorilla than the latter is separated from that of Man.

But, in some of the lower apes, the hand and foot diverge still more from those of the Gorilla, than they do in the Orang. The thumb ceases to be opposable in the American monkeys; is reduced to a mere rudiment covered by the skin in the Spider Monkey; and is directed forwards and armed with a curved claw like the other digits, in the Marmosets—so that, in all these cases, there can be no doubt but that the hand is more different from that of the Gorilla than the Gorilla's hand is from Man's.

And as to the foot, the great toe of the Marmoset is still more insignificant in proportion than that of the Orang—while in the Lemurs it is very large, and as completely thumb-like and opposable as in the Gorilla—but in these animals the second toe is often irregularly modified, and in some species the two principal bones of the tarsus, the *astragalus* and the *os calcis*, are so immensely elongated as to render the foot, so far, totally unlike that of any other mammal.

So with regard to the muscles. The short flexor of the toes of the Gorilla differs from that of Man by the circumstance that one slip of the muscle is attached, not to the heel bone, but to the tendons of the long flexors. The lower Apes depart from the Gorilla by an exaggeration of the same character, two, three, or more, slips becoming fixed to the long flexor tendons—or by a multiplication of the slips.—Again, the Gorilla differs slightly from Man in the mode of interlacing of the long flexor tendons: and the lower apes differ from the Gorilla in exhibiting yet other, sometimes very complex, arrangements of the same parts, and occasionally in the absence of the accessory fleshy bundle.

Throughout all these modifications it must be recollected that the foot loses no one of its essential characters. Every Monkey and Lemur exhibits the characteristic arrangement of tarsal bones, possesses a short flexor and short extensor muscle, and a *peroneus longus*. Varied as the proportions and appearance of the organ may be, the terminal division of the hind limb remains, in plan and principle of construction, a foot, and never, in those respects, can be confounded with a hand.

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PHYSICS

Lonely Magnetic Poles May Change Ideas of Universe

THE IDEA that there can exist in nature a magnetic pole free from the clutches of a magnetic pole of opposite sign is receiving discussion in British scientific circles.

The possibility that one part of magnetism might be separated from the other was suggested by Dr. P. A. M. Dirac, the mathematical physicist of Cambridge University, who recently spent some months in America at Princeton University. He is recognized as one of the most brilliant of living physicists.

Might Separate Poles

Roughly expressed, it is conceived possible and consistent with the quantum theory of physics that a compass needle of the smallest size could be cut in two in the middle and the north pole separated from the south. No one has ever been able to separate the two poles of a magnet. Classical theory in physics considers magnetism as a manifestation of electricity, each molecule being an elementary magnet due to the orbital revolutions of the electrons inside.

In his theoretical calculations, Dr. Dirac was looking for the reason for the existence of the smallest electric charge, the electron. He found a connection between this smallest electric charge and the smallest magnetic pole since he obtained a wave equation in his development of the fruitful quantum mechanics of the new physics, whose "only physical interpretation is the motion of an electron in the field of a single pole."

In his further reasoning Dr. Dirac finds that the strength of these lonely magnetic poles is quantized, that is, magnetism occurs in definite amounts or "gobs" in just the same way that all electricity is built up of integral multiples of the smallest electric charge, that on the electron.

Important also is his discovery of a new connection between electricity and magnetism, that allows the calculation of the attraction between the two opposite elemental magnetic poles. It is found to be nearly 5,000 times the attractive force between the electron and the proton, the negative and positive particles of electricity that are the atomic building blocks.

Magnetic poles of opposite sign have never been separated in experiments and Dr. Dirac concluded that this very great attractive force is the reason.

This theoretical work may therefore have ushered into the world of science a new entity, the magnetic pole, which scientists can use in postulating how the universe is put together. The magnetic pole may come into its own as a fundamental unit alongside the electron and proton, which are the electricity units, and the photon, the unit of light.

Prof. O. W. Richardson of King's College, London, commenting on Dr. Dirac's technical paper that appeared in the Proceedings of the Royal Society last September, suggested that the isolated magnetic poles might be useful in explaining ultra-penetrating radiations, such as the cosmic rays. He feels that while it would seem difficult for such entities as the poles to be created, the possibility of their existence may have great influence on current views of how the universe is put together.

Science News Letter, April 16, 1932

MEDICINE

Blood Examination Urged To Prevent Poisoning

RADIUM, X-rays, benzene and its various compounds, such as arsphenamine, are all known to produce injuries to the blood-forming tissues, especially the bone marrow, in certain doses and with certain susceptible persons. On the other hand these agents are used in the treatment of blood diseases. In a report to the American College of Physicians, Dr. Edwin E. Osgood of the University of Oregon Medical School reviewed the effects of these agents and the conditions under which they exert an action upon the blood-forming tissues.

It was stated by Dr. Osgood that serious poisoning from these substances in the industries is not uncommon but might be prevented by periodic blood examinations, elimination of the more susceptible individuals, reduction of exposure by local ventilation in benzene cases and the use of less toxic substances.

Science News Letter, April 16, 1932

RADIO

More Power Packed Into Ultra-Short-Wave Radio

A METHOD for packing more power into ultra-short radio waves, the form of transmission which is now the subject of intensive research throughout the world, was reported to the Institute of Radio Engineers meeting in Pittsburgh by H. N. Kozanowski of the Westinghouse Electric and Manufacturing Company.

Many radio engineers interpret Mr. Kozanowski's achievement as a step toward static-free and fadeless radio. Because ultra-short waves travel in a straight line and can be focused, it has been predicted that they will largely overcome these two bugaboos of the longer waves now used for broadcasting. One of their great disadvantages has been the limited power with which they could be used.

The new development, however, makes possible an output of at least five watts from a 60-centimeter wavelength transmitter while, according to published literature, the energy available in this range has been only a fraction of a watt, Mr. Kozanowski said.

The bringing of a piece of metal near vacuum tubes of an ordinary transmitter resulted in this discovery. Mr. Kozanowski noticed that the metal had to be in certain very exact positions to increase the output. He incorporated this idea in his new set by setting up a sliding coupling of metal tubing between the plate and filament circuits of his vacuum tubes.

Science News Letter, April 16, 1932

PUBLIC HEALTH

Warning Issued Against Home-Canned Vegetables

WARNING against home-canned vegetables which may contain the deadly botulinus germ was issued by Dr. Karl F. Meyer, director of the George Williams Hooper Foundation for Medical Research of the University of California, at the meeting of the American College of Physicians.

"All home-canned vegetables and other non-acid foods should be thoroughly boiled before use," Dr. Meyer declared. "The person who opens the container and prepares the contents for the table should be familiar with the standards of quality and should ruthlessly discard any product which has

leaky lids, an 'off odor' or other signs of spoilage. Food commercially preserved in the United States has not been connected with any of the recognized cases of botulism since 1925," he stated.

Dr. Meyer strongly criticized the custom of serving home-canned string beans and other vegetables cold as salads, often heavily seasoned with vinegar or other dressings which disguise any suspicious odors.

Public health workers now advocate home preservation of non-acid foods by drying, by curing in 10 per cent. brine, or by pickling in acidified brine.

"Aside from being simple and inexpensive," said Dr. Meyer, "these methods have the one great advantage that the food is not ready to be served from the jar, but requires thorough soaking in water and sometimes subsequent boiling—the greatest safety device against botulism."

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ARCHAEOLOGY

Piled Ceremonial Stones Found on Waterless Mesa

PILES of stones raised for unknown ceremonies by long-departed Indians have been discovered in a waterless, rugged mesaland of northern Lower California.

Upon learning of the existence of the ceremonial stones from W. D. Sullivan who discovered them, Malcolm J. Rogers of the San Diego Museum set out with Mr. Sullivan to investigate the site.

"Eighty miles southwest of Mexicali, Lower California, we found numerous small piles of lava blocks, two to three feet high, scattered usually without order over an area of four square miles," said Mr. Rogers in a statement to Science Service.

Mr. Rogers identifies the stone piles as the work of an early pre-Yuman culture, the same which he traced throughout the lower Colorado River basin. Modern Yuman tribes inhabit the extreme Southwest of the United States and parts of Lower California.

The pre-Yuman people who set up the ceremonial stones lived near them in the inhospitable region. The explorers found circular clearings on gravel mesas which Mr. Rogers identified as house-sites. All traces of weapons or household equipment of the people have vanished, save for crude, untouched stone flakes.

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IN SCIENCE

ZOOLOGY

Alarm Clocks Protect Goldfish From Herons

THE WORLD has been made safe for the goldfish in the public squares of Alameda, Calif., by alarm clocks.

Not long ago the California Division of Fish and Game received an emergency call to protect these goldfish from a colony of black-crowned night herons which were preying upon them. E. L. Sumner, Jr., assistant bird and mammal zoologist, was sent to the rescue. Potatoes and other hard objects hurled at the herons made no impression. The use of guns did not seem in order, and the zoologist was in a quandary.

Finally inspiration came. One morning he overslept, and he thought of the usefulness of an alarm clock. This started a new train of thought and forthwith he secured four of these noise-makers and strung them in the tall tree in which the herons had been dozing all day after using the goldfish pools as a night club. The alarms were set to go off at half-hour intervals.

After a week of sleepless days the herons gave up the battle and retired in disorder. They have not been seen since.

Science News Letter, April 16, 1932

ARCHAEOLOGY

Scientist Excavates Ruins Of 1,000 Year Old Pueblo

RUINS of an Indian pueblo big enough to have sheltered 2,000 people have been excavated near Rodeo, N. M., by Dr. Byron Cummings of the University of Arizona. The San Simon Valley, in which the ruins lie, is a place seldom visited, and until this time the existence of old Indian villages there has not been generally known.

The pueblo spreads over 12 acres of the great wash. Parts of the structures were uncovered as a result of recent floods. The style of the ruins is pronounced similar to the famous pueblo at Casa Grande, in Arizona.

Dr. Cummings tentatively sets 1,000 years as the age of the settlement.

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SCIENCE FIELDS

ASTRONOMY

New Comet Discovered by South African Astronomer

A COMET, probably new to the heavens, was recently discovered at the Cape of Good Hope Royal Observatory, South Africa, by Astronomer Houghton, Dr. Harold Spencer Jones, director of the observatory, reported today to the central astronomical bureau at Copenhagen. Houghton comet, as it will be called, was of the ninth magnitude, not visible to the naked eye. It was located in the southern heavens, not far from the south pole of the skies, and south of the constellation of Musca, the fly, which is the only group of stars named after an insect. American observatories have been notified of the discovery through Harvard College Observatory.

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METEOROLOGY

March Weather Map Reverses Colors

BLACK is white and white has turned black on the country's weather map for March, which has just been issued by the U. S. Weather Bureau.

The great central and eastern sections of the United States averaged as much below normal in temperature during the past month as they have been above normal for almost a year. While the East got cooler, the Far West warmed up. Pacific coast states, which have experienced an abnormally cold winter, were several degrees warmer than normal during March, the chart shows. The last month of normal temperature east of the Rocky Mountains was August, 1931. With the exception of March, the last month that averaged temperatures cooler than normal was May, 1931.

The exceptional cold spell during the first part of March drove temperatures far below normal over the greater part of the country and forced the frost line much farther south than it had been at any time during the winter. Freezing weather or killing frost was felt in

nearly all of Florida and over the entire state of Texas.

The rainfall chart for March is also characterized by freakish features. Following heavy precipitation during the winter, no water fell last month in portions of Southern California, New Mexico and Arizona.

But just about 200 miles east of the line of zero rainfall in New Mexico, there is a spot of twice normal precipitation. And about 300 miles farther east only ten per cent. of normal rain fell. This dry area extends over large portions of Oklahoma, Kansas, Missouri, Nebraska and neighboring states.

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METEOROLOGY

Tumbled Snowflakes Turn Into Double Cone Shape

HOW the double-cone-shaped snowflakes which are frequently seen in autumn and early spring snowfalls are formed is explained in a brief note in *Science*. The writer was the late Wilson A. Bentley of Jericho, Vt., who died a short time ago.

These curious flakes, Mr. Bentley wrote, always come out of cumulonimbus clouds, that is, snow-clouds at moderate heights. They usually fall when the temperature at the ground is above freezing, from 34 to 44 degrees Fahrenheit. They have a granular texture and are built up mainly from countless undercooled cloud droplets that have frozen loosely together.

Mr. Bentley held the opinion that these double-conical flakes start with an ordinary snowflake as a nucleus. The nuclear snowflake is of the type most commonly formed at the lower elevations, a more or less finely-branched, flat, six-pointed star. Tumbled about in the whirling upward currents of air within the cloud, it becomes thickly coated on both sides with frozen cloud droplets or granular snow. It now begins to fall with the denser side turned downwards, and since it falls faster than the cloud droplets, it overtakes some of them and attaches them to its lower surface, forming light granular material. The gravitational balance is thereby disturbed, and what was the lighter, upper side becomes the heavier. The flake therefore turns over and falls with this side downward, repeating the droplet-capturing and granule-forming process. In this way the original flat flake builds up a little pyramid or cone on both its sides.

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MEDICINE

New German Cancer Test Reported Successful

CANCER, it is claimed, can be detected by a serum reaction discovered by Dr. H. J. Fuchs of Berlin. The reaction is based on the fact that fibrin from the blood of a person without cancer is broken down or digested by the serum of the blood of a person with cancer, with the production of some non-protein nitrogenous substances which can be detected by suitable chemical means.

The method as it was described by Dr. Fuchs required special apparatus and some special training for the observer, which tend to prevent its general use.

Prof. M. von Falkenhausen of the University of Breslau, Germany, now reports a simplification of the method that may make it possible for other observers to test its validity. He has introduced into the reaction a colorimetric procedure which he states makes the method more exact and at the same time much simpler to carry out. He reports a series of eighty cases in which the reaction was used and in which there was not a single failure in the diagnosis. In some of the cases the reaction was negative and in these subsequent surgical operation or medical treatment established the correctness of the diagnosis.

Prof. von Falkenhausen gives a preliminary description of his method in the *Deutsche Medizinische Wochenschrift* and promises a fuller paper later. He believes that his method will be of great assistance to physicians in the campaign against cancer.

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ARCHAEOLOGY

New Indian Tomb Yields Striking Artifact

See Front Cover

THE FIRST picture to reach the United States of one of the most striking art objects recovered from Indian tombs recently opened at Guerrero, Mexico, is shown on the cover of this week's *SCIENCE NEWS LETTER*. The vessel was photographed just as it was taken from the tomb, with earth still clinging to it. The style is said to be similar to that of the Toltecs, powerful Mexican Indian tribe which attained a high civilization about the time of the Middle Ages.

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RADIO

Fighting Radio's Bugaboos

Through Use of Ultra-Short Waves, Static and Fading May Be Overcome and Messages Carried to Distant Planets

By J. W. YOUNG

A WORLD that sometimes receives news of technical developments with bored unconcern is on tiptoe to learn more about a new kind of radio now the subject of intensive research in laboratories of both America and Europe. Occasionally brief demonstrations of the new apparatus are given, and for days thereafter the papers tell how radio energy has been focused as if it were from a searchlight and sent with the consumption of an extremely small amount of power in a straight line to a receiver some miles distant.

It is not generally realized that these demonstrations may herald the day when radio will be free of its two greatest bugaboos, static and fading, when television will become as commonplace in the home as sound radio is now, when even our nearest planetary neighbors, Mars and Venus, will be reached from the earth by radio signals just as continents on our globe are joined together today.

Strange Capabilities

The basis for these views into the future tells the story of the rise of ultra-short wave radio and the strange things that scientists have found these previously neglected radio waves capable of doing.

In the beginning of radio broadcasting the wavelengths then considered most choice—from about 200 to 500 meters—were set aside for stations broadcasting entertainment, and they continue to be used for that purpose. The thousands of radio amateurs who had been free to use these wavelengths were pushed down the scale to the "worthless" bands below 200 meters.

As might have happened in a story book, appearances soon proved deceptive. The amateurs began to do wonders with their "worthless" strip of electromagnetic vibration. They learned how to talk to friends on the other side of the world with less power than a broadcasting station uses to send its program a score of miles. They even heard their signals echo back after circling the earth several times.

While amateurs worked largely by inductive experimentation, commercial interests were busy applying the deductive methods of research to the lower wavelengths and soon they began to link the continents for long distance radio telephone communication by using wavelengths well below the 200-meter mark.

Research is continuing to tear the veil from that part of the electro-magnetic spectrum between radio waves and heat waves, revealing more clearly than ever before the fact that all radiations are of the same kind—from those of powerful long wave wireless stations like the U. S. Navy transmitter at Arlington, Va., down through radio broadcast waves, heat waves of a hot iron, light rays from the sun, and X-rays of medical and industrial use, even unto the cosmic radiation from outer space. The difference is only a matter of the length of the vibration.

But what a great difference there can be in wavelength, even in that comparatively narrow band of the spectrum which includes the radio waves! The U. S. Navy is planning stations that will put on the air waves longer than 25 miles. A common length for a wave from a broadcasting station is six hundred feet. You can talk to Europe from your telephone on waves as short as 42 feet. At about this length, radio waves become more interesting. From a length of thirty feet, or about ten meters, down to .0008 of a millimeter, scientists call them ultra-short radio waves.

Use of the term, wavelength, to locate radiations or radio energy on the spectrum has been given up for many purposes in favor of the measurement of frequency by the unit, kilocycles, in which the dials of home radio sets are now calibrated. As wavelength increases, frequency decreases, for, since the speed at which the waves travel remains the same, it takes a long wave longer to pass a fixed point than a short one.

Ultra-short radio radiations do not act as good radio waves should nor are they well-behaved heat waves, the form of radiation of next shortest wavelength. They combine properties of both. These waves are the scientific curiosities

that hold so much in store for tomorrow. Their relatives farther down the spectrum are also interesting.

Next to heat or infra-red waves, which blend into and overlap the shortest radio waves, are light waves, the longest being red and the shortest violet. Beyond the short violet rays are the invisible, but photographically active ultra-violet rays. X-rays, of medical fame, and then gamma rays follow. Last in the electro-magnetic spectrum, one school of thought has already placed the recently discovered cosmic rays whose source we do not know. The longest of these rays are said to have a wavelength of only one quadrillionth of a centimeter. A centimeter is less than half an inch.

Can be Focused

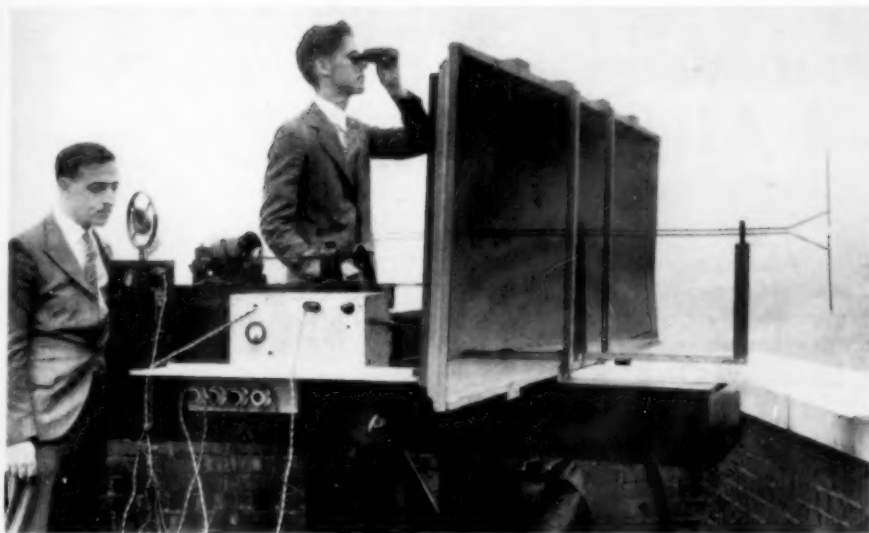
Among such a weird collection of relatives, it does not seem so surprising to find stunted radio waves with peculiar habits.

Since they are between radio waves and heat waves, they act very much as both these neighbors do, hence the name quasi-optical has been applied to them. The shorter ones can actually be focused by lens and reflected by mirrors. For best results in focusing, the mirror must have a diameter several times the length of the wave.

Such focusing makes possible the concentration of greater radio energy than has been possible previously, but, in spite of the great amount of power that is brought together in such a small space these waves cannot be sent long distances over the surface of the earth—not without repeater stations or reflectors placed about every 100 miles.

Since they can be reflected and focused they can be made to travel in a straight line. The resulting "searchlight" beam of radio energy, refuses to follow the curvature of the earth, as do longer waves sent out by present broadcasting methods, but goes shooting off into space as soon as it has passed the curve of the horizon.

Consequently the range is limited by the finding of two points between which a straight line can be drawn. If the apparatus is taken to the tops of tall buildings or put on mountain peaks this distance may be as much as 100 miles. Marconi, the radio pioneer, has already given demonstrations with waves of this kind over distances of 25 miles.



AIMING ETHEREAL MESSAGE

The curved metal sheet is a reflector that focuses short wave radio energy as if it were a beam of light. This apparatus is being used experimentally by the Westinghouse Company, one of the many organizations pioneering in the new field.

Conversation has been sent across the English channel on a wave only seven inches long. The aerial was three-quarters of an inch long and the power used only sufficient to light a small flashlight bulb. The aerial was placed at the focal point of specially shaped metal reflectors, 10 feet in diameter, which gathered the radio energy into a narrow beam as if it were the light from a brilliant bulb and aimed it at a similar receiving mirror on the other side of the channel.

If the beam is made very narrow it must be aimed carefully at the receiving mirror. Only a receiving station in the direct path of the beam is able to hear its message—an advantage of secrecy that will be valuable in war.

Because these ultra-short waves travel in a straight line between the sender and receiver and keep away from the variable electrified atmosphere far above the surface of the earth, the well-known Kennelly-Heaviside layer, they stay practically free of fading and static. The ionized gases about 50 or more miles above the earth reflect from a rough under-surface most of the waves that reach it and have come to be blamed largely for the two bugaboos of radio.

Radio engineers have noticed that only occasionally are waves below 30 feet in length reflected back to earth from the Kennelly-Heaviside layer. These waves must, it is thought, travel on into outer space.

Dr. I. E. Mourontseff, research engineer who has been directing the experimental short-wave work for the

Westinghouse Company, suggests that knowledge of these waves, which apparently pass on through the ionized gases, brings the earth a step nearer to communication with neighboring planets. The first radio transmitter to Mars would simply be a powerful short wave sender having its huge parabolic reflector directed heavenward.

"We are certain," Dr. Mourontseff explains, "not only that heat and light waves can penetrate something like the Kennelly-Heaviside layer, but that all radio or 'dark light' waves less than seven meters long will penetrate that layer and leave the earth.

May Reach Mars

"It is conceivable," he continues, "that the power we have succeeded in getting into 42-centimeter beams we have worked with is sufficient to pierce the Kennelly-Heaviside layer and travel 35,000,000 miles to Mars. It is possible that such small power may carry to such great distances because of the fact that practically all intervening space is really a high vacuum and does not, therefore, absorb the waves, once they get through the earth's atmosphere."

Though they will not be absorbed in outer space, quasi-optical waves disappear and weaken strangely on the surface of the earth among familiar objects which have dimensions very nearly the same as the length of the waves.

When radio is installed on a train between engine and caboose care must be taken to see that the proper wave length is used, Eduard Karplus, engi-

neer for the General Radio Company, points out. The wave used must be shorter than the diameter of tunnels, or the radio will not work while the train is underground. Yet if the wave chosen is so short that its radiations are very directive, train communication will be interrupted by curved tunnels.

Mr. Karplus also gives interesting facts about the ability of quasi-optical waves to penetrate rain and fog. Humidity, rain and fog have no effect on waves down to five centimeters in length, he says. But below five centimeters they are weakened by the humidity of the atmosphere and even by the amount of carbon dioxide in the air.

Surprisingly, there is a short portion of the quasi-optical spectrum whose waves radiate such a small amount of energy into the atmosphere that they have not been found useful for communication. They are absorbed and scattered in the immediate vicinity of the transmitter, Mr. Karplus says. Radiation useful for communication starts again at the shorter heat or infra-red waves and in the light range.

Interesting methods of sending sound by light are being devised. Music has been sent 3,000 feet across the Hudson river at New York on a narrow beam of neon light by engineers of the General Electric Company. Dr. E. W. F. Alexanderson of the same company modulates electrical impulses from sound into high frequencies on a light beam from a high intensity arc and picks up this talking light with a photo-electric cell. He suggests as a radio aerial of the future, a powerful arc light mounted upon the top of a tall building.

"Light broadcasting may have the same relation to radio broadcasting that the local newspaper has to the national newspaper," Dr. Alexanderson suggests. "These light waves can be received only at relatively short distances, perhaps ten miles. Each community could then have its own light broadcasting system."

In company with other scientists, Dr. Alexanderson sees in short waves that travel in a straight line a solution to one of television's most important problems. The greatest difficulty in television today, he believes, lies in the method of transmission. Radio waves usually follow several paths in traveling from the transmitter to the receiving station. Each ray following a different path produces a different image so that a composite image is apt to be blurred. For this reason television has been tending toward the shorter waves.

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ETHNOLOGY

Dream Interpreter of Old Egypt Advertised Ability

A CLEVERLY WRITTEN advertising sign, the idea of an enterprising business man in Egypt in the third century B. C., has been discovered by Dr. Nathaniel Julius Reich of Dropsie College. The advertisement, written on a small stone, has been deciphered by Dr. Reich, as follows:

"Dreams I explain, holding the commands of the Gods. Good Fortune! A Crete will interpret them."

Analysis of this ancient Egyptian "ad" shows that advertising principles were understood long ago. The sign is brief and comes to the point in the first sentence. It is subtly suggested—though not actually promised—that the customers who bring their dreams to this man for explanation will hear good and happy interpretations. The customers are reassured that the interpreter knows his business, for he is "under command of the Gods." As a last alluring and romantic touch, the man reveals himself as a foreigner in Egypt, who has come from the Island of Crete.

This old advertisement was found by Dr. Reich as he examined a number of inscriptions from the Temple of Serapis, near Memphis. The dream-interpreter's sign had been strategically set up before the Avenue of Sphinxes which led to the temple. Along this avenue passed Egyptians who came from near and far to spend a few days on the temple grounds. They came in order to sleep there and to have their dreams interpreted by the priests, who were the official and paid dream-interpreters. The dreamers listened carefully to the interpretations, and planned their future days accordingly.

"Muscling In"

The stranger from Crete was therefore daringly edging himself into the dream business against formidable competition of the priests.

People who came to the Temple of Serapis often wrote down their dreams, and Dr. Reich has discovered some of these writings on papyrus. The dreams deal with attacks by lions and bandits.

Dr. Reich is making a detailed study of writings found at the Temple of Serapis, and is finding in them a great deal about manners, customs, and every-

day life of the ancient Egyptians.

Only four scholars living today, Dr. Reich being one of them, are skilled in reading demotics, the "people's handwriting" which was used in Egypt for a thousand years, from 700 B. C. to 300 A. D. Understanding of demotics requires a knowledge of hieroglyphics, hieratics, and Coptics, the latter being Egyptian written with Greek letters.

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MEDICINE

Enzyme Stops Formation Of Surgical Adhesions

A LARGER number of successful surgical operations was visioned by scientists who heard Dr. Robert P. Walton of Tulane University, New Orleans, describe a substance with which

MEDICINE

Gastric Ulcer Treated With Extract From Hog's Stomach

RELIEF from pain and other distressing symptoms of stomach ulcer in 85 patients who were given a washed and dried extract of the mucous lining of hogs' stomachs is reported to the American Medical Association by Dr. Arthur J. Atkinson of Northwestern University Medical School. At the same time a warning against impure preparations of the extract, which is called mucin, was issued in the *Journal of the American Medical Association* by Drs. Andrew B. Rivers, Frances R. Vanzant and Hiram E. Essex of the Mayo Clinic, Rochester, Minn.

The patients receiving the mucin were free from pain in from three to five days, Dr. Atkinson reported.

The theory of the treatment is that the mucin coats the ulcer and protects it from the protein-digestive action of the stomach secretion. Mucin also neutralizes the corrosive action of the stomach juice by combining with the free acid contained therein.

he has succeeded in preventing adhesions following operations in the body cavity. Dr. Walton worked in collaboration with Dr. Alton Ochsner and Dr. Earl Garside.

The adhesions are digested in a very weak solution of the protein-dissolving enzyme, papain. Unusually low concentrations of papain were found to work best. They contained only two thousandths of one per cent. of the dry powder. This substance is now being distributed for trial in hospitals and laboratories, it was said.

"Using experimental animals," Dr. Walton explained, "dense adhesions were produced which bound the abdominal organs in a firm mass. When these adhesions were broken by surgical operation, they reformed in most cases. However, if the weak papain solution were introduced at the time of the operation the adhesions reformed in a much smaller proportion of the cases."

"It was suggested that the exuded fibrin, a glue-like substance principally responsible for the development of adhesions, was dissolved just enough to prevent its development into permanent adhesions."

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Dr. Atkinson emphasized the fact that mucin is not a "fool-proof" substance which can be prescribed and then the patient forgotten. His patients were given it with milk and cream feedings and in water.

The warning of the Rochester investigators came as a result of noticing that their patients responded differently to different batches of mucin. With some they seemed to be helped and with others they seemed to be definitely harmed. Investigation showed that some of the batches of the commercial preparation contained a substance that stimulated secretion of the gastric juice, thus defeating the purpose of the mucin treatment, which is to neutralize the corrosive action of the gastric juice, not to increase the amount of it. Until a consistently standardized, pure preparation of mucin is supplied, it will not be possible to determine the value of mucin in treatment of ulcers, they declared.

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ENGINEERING

Steel Jar Will Rescue Men Imprisoned in Submarines

Apparatus Developed by U. S. Navy Permits Crews to Be Raised From Sea Bottom Without Risk of Having "Bends"

NEW SUBMARINE rescue chambers developed by the U. S. Navy have made it possible at last to bring men up from a disabled submarine without subjecting them to the immense pressures existing in the ocean depths or requiring their exposure to the extreme cold of deep sea water.

This new device, a great steel jar looking very much like a counterpart of the Arabian Nights' jars in which the forty thieves took refuge, can be lowered into the depths by its own machinery. After it is attached to the submarine hatch, the trapped men can step directly into the jar or be lifted into it if unconscious. The men are subjected to only atmospheric pressure as in the submarine and they require no decompression. They make the trip to the surface in a dry lighted chamber.

The new type of rescue chamber is the latest development of a series of devices recently invented for the purpose of saving the crews of disabled submarines. Until very recently, the only known method for rescue of the men was to bring one end of the submarine above the surface of the water or to raise the vessel completely by means of pontoons.

Bow Raised

When the S-48 was sunk in Long Island Sound on Dec. 7, 1921, the water was blown out of the forward ballast and fuel tanks, raising the bow far enough above water to let the crew escape through that end. But the S-48 sank in only 67 feet of water; had she been in water deeper than her length, or had her hull been damaged, this scheme would not have worked.

The raising of the vessel by means of pontoons requires tunnels to be blown out by divers under the hull, the reeving of chains through these tunnels, and the connection of these chains to the submerged pontoons. The water is then blown out of the pontoons after which they are buoyant and tend to lift the hull.

The capacity of these pontoons is 80

tons each. Only six of them can be used at one time in raising a submarine. Therefore the total lifting power of all the pontoons which it is practical to use in such operations is only 480 tons. As the smallest submarines we now have are about 900 tons displacement, they can be raised in this manner only when the various compartments, ballast tanks, and so on, are made water tight and, if flooded, the water blown out of them to obtain the additional buoyancy required.

Whether or not a submarine hull can be successfully raised by this method depends upon the availability of salvage ships and favorable weather conditions. It is now discarded as a means for saving life and is used only for salvaging property, because even under the most favorable conditions the method is very slow and susceptible to failure.

Since the tragic sinking of the S-4 in December, 1927, when divers worked desperately but vainly to raise her in time to save the men pleading for their lives within, Navy Department experts have been hard at research to devise successful methods to permit the safe escape of crews from the compartments of a sunken sub. Many plans were devised and more than 4,000 suggestions from outside the Navy were considered, but only two principal methods have passed the severe tests demanded and been found satisfactory—the "lung," by which men can emerge and ascend without aid from the surface, and the rescue chamber which must be lowered by a rescue ship.

Six mine sweepers of the type named for birds—the Falcon, Widgeon, Pigeon, Mallard, Chewink and Ortolan have been outfitted as submarine rescue ships. Five of these will be equipped with the new rescue chamber.

The operation of the rescue chamber is quite simple, and requires no effort on the part of the men in the submarine. In addition to ballast tanks, it consists of two compartments, the upper one—air tight, water tight, and dry—gives the chamber just enough buoyancy to keep it on the surface if left



LIKE AN ARABIAN NIGHTS' JAR
—the new submarine rescue chamber of the U. S. Navy being prepared for a descent to a stricken submarine. It will bring up a maximum of fourteen trapped sailors at each trip.

alone. The lower compartment is open.

When the chamber is to be lowered, a diver must first go down to the submarine and attach a steel guide cable to a ring beside the hatch on the deck. Air motors within the chamber then reel up this cable and draw the chamber down until the round lower edge rests on the metal flange around the hatch. As soon as it is in place, the water is blown out of the lower compartment, after which the sea pressure from without will hold the chamber securely in place as though it were a vacuum cup. The hatch between the compartments and the one into the submarine may then be safely opened, allowing easy exit from the submarine into the dry chamber. When the men are removed both hatches are again closed, water is allowed to fill the lower compartment and the ballast tanks are blown, creating the buoyancy necessary to carry the chamber up to the surface.

Two men are required to go down in the chamber to operate it, and in addition to these it will hold from twelve to fourteen others. Repeated trips below may be made until all hands are safely on the rescue ship.

The bell, in addition to its electric lights, is equipped with telephones of the battery-less type, by means of which communication can be maintained at all times between the rescuers in the bell, the personnel in the submarine and the crew of the rescuing surface ship.

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BIOCHEMISTRY

Male Sex Hormone Prepared In Pure Form For First Time

THE MALE hormone, or gland secretion that is responsible for typically masculine physiology in men and male animals, has been prepared for the first time in fully purified, crystalline form by Dr. Adolf Butenandt of the University of Göttingen. Dr. Butenandt has also analyzed it and determined the proportions of carbon, hydrogen and oxygen that enter into its makeup. They are expressed by the formula $C_{16}H_{26}O_2$.

Although other physiologists have been at work on the same problem, the final crystallization of the hormone is regarded as of the greatest importance. When any preparation can be made in crystalline form, that signifies a high state of purity, which makes possible really accurate comparative physiological tests, and may even lead the way to synthetic preparation.

The male sex hormone seems to be very closely related chemically to its physiological analog, the female sex hormone. This hormone was prepared first in the United States by Professor Edward A. Doisy of the St. Louis University School of Medicine and was announced at the Thirteenth International Physiological Congress at Boston in August, 1929. Subsequently, Dr. Doisy was the first to announce the empirical formula of this female sex hormone, $C_{18}H_{26}O_2$. Dr. Butenandt announced the independent isolation of the female hormone some months subsequent to Dr. Doisy's announcement and the independent analysis, a short time after, thus confirming Dr. Doisy's findings.

Find Wide Usage

The female sex hormone is already being used in medicine to a considerable extent and it may be anticipated that its male counterpart will likewise find clinical employment after further tests on animals have given more data on which to base its first applications to human cases.

Dr. Butenandt, therefore, must be credited with the first isolation and analysis of the male hormone and the independent isolation and analysis of the female sex hormone.

Both the sex hormones are prepared from an ingredient that might well have gone into a witch's cauldron of

old—human urine. The female sex hormone can be prepared only from that of pregnant women. However, the long and elaborate processes of condensation and precipitation through which the material must be put before the final few crystals are isolated removes any suggestion of its original repulsive source.

Dr. Butenandt's announcement of the preparation of male sex hormone in crystalline form is made in the German science weekly, *Forschungen und Fortschritte*.

Science News Letter, April 16, 1932

BIOCHEMISTRY

French Scientists Report Two New Sex Hormones

By DR. VICTOR COFMAN,
Science Service Correspondent

DISCOVERY of two substances that affect profoundly the growth and activity of female sex organs has just been reported to the French Academy of Sciences by Drs. André Girard and Georges Sandulesco of the Roussel Research Laboratories in Paris. These substances are described as new sex hormones, in addition to the remarkably active substance known as theelin, the female sex hormone which was discovered by an American, Prof. Edward A. Doisy of the St. Louis University School of Medicine.

The two new hormones belong to the same chemical group, the oxy-ketones, which means that they are related to acetone and alcohol, or rather, phenol. They differ only slightly in composition. They all contain the same quantity of carbon and oxygen in their molecule, namely eighteen carbon and two oxygen atoms, and differ only in the number of hydrogen atoms in the molecule. While theelin has twenty-two hydrogen atoms, the newly-discovered hormones contain only twenty, and differ between themselves only in the arrangement of the atoms. The new hormones have been named "equiline" and "hippuline" because they have been extracted from the kidney excretion of pregnant mares. Several tons of this material had to be used in order to extract about

three grains of the new hormones.

The action of equiline and hippuline differs from that of theelin, affecting chiefly only one of the female sex organs, whereas theelin affects more.

Science News Letter, April 16, 1932

CHEMISTRY

Probably No Elements Heavier Than Uranium

HOPE that there are more than the 92 chemical elements now known is not bolstered up by theoretical studies made by Dr. V. V. Narliker, University of Cambridge scientist. Investigating the highest atomic number in the light of wave mechanics, Dr. Narliker finds that the highest possible atomic number seems to be 92, that of uranium, heaviest known element, and not 137 as previous studies had suggested. His report was made to *Nature*.

Science News Letter, April 16, 1932

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

OF SCIENCE NEWS LETTER published weekly at Baltimore, Md., for April 1, 1932.
Washington
District of Columbia } ss.

Before me, a Notary Public in and for the District of Columbia aforesaid, personally appeared Watson Davis, who, having been duly sworn according to law, deposes and says that he is the Editor of the SCIENCE NEWS LETTER and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Editor, Watson Davis, 21st and Constitution Ave., Washington, D. C.

2. That the owner is:
Science Service, Inc., 21st and Constitution Ave., Washington, D. C., a non-profit corporation without stock, operating as the Institution for the Popularization of Science.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

Watson Davis,
Editor.

Sworn to and subscribed before me this 28th day of March, 1932.

[SEAL]

Charles L. Wade.

(My commission expires April 6, 1933.)



The Crow

THE AMBITIOUS gardener who wants an early crop of sweet corn has to contend with many troubles, not least among which is the crow. No sooner do the first tiny sprouts appear above the soil than this bold black thief goes hopping along the row, pulling up plant after plant, and swallowing the seed kernel still clinging to the roots. The crow is a choicy rascal. He does not want hard, dry corn—won't touch it if there are bushels of it lying about. What he wants is the soft, sweet grain, with its starch turned to sugar by the digestive processes going on during the sprouting. For the same reasons he may later raid the corn patch while the ears are soft and green but lets it alone when they begin to get ripe and hard.

Yet for all his thievish habits, that must make him seem the very embodiment of Satan to the enraged gardener, the crow has redeeming traits. Corn is about the only crop he troubles, and it is not the major portion of his diet. Like all other birds, he feeds mainly on insects. June bugs and cutworms in the early summer and grasshoppers in August are his staples, though many another enemy of the garden goes into his ample interior. To discourage him from stealing corn, and at the same time compel him to return to his normal insect diet, a well-known ornithologist has recommended tarring the seed.

In addition to two or three smaller forms of the true crow found in this country, a quite distinct species, the fish crow, is abundant along the Atlantic and Gulf Coasts. He is a smaller bird than the common crow, weaker in flight and in voice, and in general he is not so cheerfully noisy a ruffian as the more familiar cornfield nuisance.

Science News Letter, April 16, 1932

PHYSIOLOGY

Epilepsy May be Caused By Permeable Brain Cells

FAULTY structure of the brain cells, which appears to let some of the important mineral, potassium, leak out or other substances to enter when much water is drunk, may be the cause of epilepsy, Dr. Irvine McQuarrie, professor of pediatrics at the University of Minnesota School of Medicine informed members of the American College of Physicians.

When epileptic patients are kept from drinking much water, many of them do not have convulsions, Dr. McQuarrie found, and they excrete much more sodium and chlorine than potassium. When under certain conditions these patients are allowed to drink large amounts of water, so that some of it is stored in the body cells, the reverse is true. The patients have epileptic convulsions, and at least 24 hours before these start, the amount of potassium in the urine may be found to be very much increased. This, Dr. McQuarrie thinks, indicates a "leak" of potassium from somewhere in the body, probably from the brain cells.

The convulsions, which occur when water is stored in the epileptic's body, without storage at the same time of a certain amount of mineral matter, are due to dilution of the body fluids surrounding the cells, Dr. McQuarrie suggested. When just enough common salt (sodium chloride) is added to the

diet to keep the extra water from diluting the body fluids, the convulsion tends to be prevented. From these and other observations, Dr. McQuarrie concluded that epilepsy is due to some obscure disturbance in the physiology of brain cells, such as this tendency to let some of their contents leak out into the surroundings.

Science News Letter, April 16, 1932

The Science Service radio address next week will be on the subject of



THE ANTHROPOLOGY OF THE AMERICAN CRIMINAL

Dr. E. A. Hooton

professor of physical anthropology at Harvard University, will deliver the address, speaking directly from the historic hall of the American Philosophical Society, which will be meeting in Philadelphia.

FRIDAY, APRIL 22

at 3:45 P. M., Eastern Standard Time

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• First Glances at New Books

Anthropology

WIRA KOCHA, Volume 1, number 1—Edited by Julio C. Tello, Lima, Peru; subscription foreign countries \$5. This new "Peruvian review of anthropological studies," written in Spanish and illustrated, will appear quarterly. The periodical takes its name from the Creator God of ancient Peru. The first number includes a long paper by Rebeca Carrion Cachot on clothing worn by Indians of Paracas, from which so many fine textile specimens have survived; a classified study of foods eaten by Peruvian Indians; and an article by Dr. Tello himself describing a remarkable piece of pottery art from Nasca—a model of an entire family group, adults, children, and four dogs.

Science News Letter, April 16, 1932

Biography

HUXLEY: PROPHET OF SCIENCE—Houston Peterson—*Longmans, Green*, 338 p., \$3.50. A popular presentation of the debates that shook the worlds of theology and biology a couple of generations ago, centered around the life of the wildest-winged of all the stormy petrels of that age.

Science News Letter, April 16, 1932

Ethnology

AMONG THE ESKIMOS OF WALES, ALASKA—Harrison Robertson Thornton—*Johns Hopkins Press*, 235 p., \$4. A vivid description of Eskimo life in western Alaska, as it was before white men invaded that part of the North. The record, written long ago and now published for the first time, was by a missionary-teacher who spent the years 1890 to 1893 among the Eskimos at Cape Prince of Wales. In ninety-three, Mr. Thornton met his death at the hands of native desperados. Chapters of his memoirs deal topic by topic with aspects of Eskimo life and character. Mr. Thornton's widow and his nephew, Dr. W. M. Thornton, Jr., edited the manuscript.

Science News Letter, April 16, 1932

Entomology-Medicine

MEDICAL ENTOMOLOGY—W. A. Riley and O. A. Johannsen—*McGraw-Hill*, 476 p., \$4.50. Since the pioneer days of Theobald Smith and Ronald Ross, the detectives of science have fastened the stigma of murderous conspiracy upon one arthropod after another. The present volume makes up a really impressive Book of Rogues, useful alike to the medical and public

health professions, and to the entomologists who are their allies. A thirty-page bibliography completes the book.

Science News Letter, April 16, 1932

Ornithology

THE BIRDS OF THE NATUNA ISLANDS—H. C. Oberholser—*Government Printing Office*, 137 p., 25c. An account of the avifauna of a little-visited group of islands lying almost on the equator in the South China Sea.

Science News Letter, April 16, 1932

Pets

OUR DOGS—C. E. Harrison—*Orange Judd*, 225 p., \$2. A manual of practical information on dog training. It is astonishing how many of the things the amateur dog trainer does innocently and "by instinct" are the wrong things, ruinous to a good dog. This book points out such pitfalls and the right path that avoids them.

Science News Letter, April 16, 1932

Psychology

PSYCHOLOGY AT WORK—Edited by Paul S. Achilles—*Whittlesey House*, 260 p., \$2.50. To quote the editor work "portrays in a few brief sketches some of the interesting and significant things that psychologists have done and are doing." The seven chapters cover varied fields from study of the preschool child to the relation of the science to social and political problems. Each is by a psychologist eminent in his field.

Science News Letter, April 16, 1932

Engineering

TOOL AND DIE DESIGN—Charles Bradford Cole and Frank W. Curtis—*American Technical Society*, 65 p., \$1.50. A handbook on tool design, die making and metal stamping.

Science News Letter, April 16, 1932

Chemistry

CHEMICAL ARITHMETIC—Saul B. Arenson—*Wiley*, 108 p., \$1.25. An elementary handbook for the university course in general chemistry covering the simpler types of numerical problems occurring in this course.

Science News Letter, April 16, 1932

Zoology

WARM-BLOODED VERTEBRATES—A. Wetmore, G. S. Miller, Jr., and J. W. Gidley—*Smithsonian Institution Series*, 389 p. Dr. Wetmore tells an astonishing lot about birds in his section of the book, considering the limitations of space allotted; and his associates Mr. Miller and the late Dr. Gidley do equal justice to the mammals, both living and fossil. Highly readable popular accounts of the various animal types are salted with interesting, and sometimes amusing, anecdotes of incidents attending their collection.

Science News Letter, April 16, 1932

Geology

THE BUILDING OF KENTUCKY, AND OTHER PAPERS—W. H. Twenhofel and others—*Kentucky Geological Survey*, 328 p., \$1.25. A well-written account of the historical geology of a state that has a great deal of geological history within its borders. It would be a most excellent thing for students if other states might be provided with similar books, as many are already provided with adequate descriptions of their trees, shrubs and wildflowers.

Science News Letter, April 16, 1932

Botany

THE FANTASTIC CLAN: THE CACTUS FAMILY—J. J. Thornber and Frances Bonker—*Macmillan*, 194 p., \$3.50. A well conceived, vividly executed, attractively illustrated book about a plant family that is becoming increasingly popular both among amateur botanists and fanciers of curious ornamentals.

Science News Letter, April 16, 1932

Geography

NEW CENSUS ATLAS OF THE WORLD—Edited by Frederick K. Brantom—*Reilly and Lee*, 256 p., \$3. Only about half the pages in this unusual atlas are map pages. There is a large descriptive section containing facts about the States of the Union and foreign countries. A glossary of geographic terms is a useful feature of the book; likewise the compact history of geography and exploration. Attractive photographs are scattered through the text.

Science News Letter, April 16, 1932

Science News Letter will secure for its subscribers any book or magazine published in the United States. Send check or money order to cover regular retail price (\$9 if price is unknown, change to be remitted) and we will pay the postage. Address: Library, Science Service, 21st and Constitution Avenue, Washington, D. C.